CLAIMS

1. A temperature-controlled actuator comprising:

a housing (12) having a proximal end and a moveable distal portion;

a core-wire (16) extending along the housing, the core-wire having

a distal section (22) anchored to the distal portion of the housing, the distal section having

an austenite state, and

a martensite state,

the distal section being configured to move the distal portion of the housing by transitioning between the austenite state and the martensite state in response to a temperature change along a thermometric section (22, 24) of the core-wire, and

a proximal section (24) in mechanical communication with the distal section, the proximal section transmitting tension to the distal section;

a tensioning element (20) coupled to the proximal section of the core-wire, the tensioning element being configured to constantly apply a tensioning force to the core-wire.

2. The temperature controlled actuator of claim **1**, wherein the distal section comprises a nickel-titanium alloy.

3. The temperature controlled actuator of claim **1**, wherein the housing comprises a flexible tube.

4. The temperature controlled actuator of claim **1**, wherein the housing comprises a tube having a flexible distal portion.

5 The temperature controlled actuator of claim **4**, wherein the flexible distal portion is configured to assume a pre-determined shape when in an equilibrium state.

6. The temperature controlled actuator of claim **1**, wherein the housing comprises a tube having a hinged distal portion.

7. The temperature controlled actuator of claim **1**, wherein the housing is configured to define a path when in a compressed state.

8. The temperature controlled actuator of claim **3**, further comprising a rigid sleeve (14) enclosing a proximal portion of the flexible tube.

9. The temperature controlled actuator of claim **1**, wherein an austenite transition temperature of the distal section exceeds an austenite transition temperature of the proximal section.

10. The temperature controlled actuator of claim **1**, wherein the thermometric section comprises the distal section of the core-wire.

11. The temperature controlled actuator of claim **10**, further comprising an intermediate section between the proximal section and the distal section.

12. The temperature controlled actuator of claim **11**, wherein the intermediate section comprises an alloy having an austenite state and a martensite state, and the proximal section comprises an extension of the intermediate section, the extension having a smaller diameter than the intermediate section.

13. The temperature controlled actuator of claim **12**,

wherein the proximal section is in an austenite state when the distal section in a temperature-induced martensite state, and

wherein the diameter of the proximal section is selected such that the tensioning force causes the proximal section to be in a stress-induced martensite state when the distal section is in a temperature-induced austenite state.

14. The temperature controlled actuator of claim **1**, wherein the thermometric section comprises the proximal section of the core-wire.

15. The temperature controlled actuator of claim **11**, wherein the proximal section is configured to transition between an austenite state and a martensite state in response to a temperature change along the proximal section of the core-wire.

16. The temperature controlled actuator of claim **12**, wherein the distal section comprises an extension of the intermediate section, the extension having a smaller diameter than the intermediate section.

17. The temperature controlled actuator of claim **16**,

wherein the proximal section is in a temperature-induced martensite state when the distal section is in an austenite state, and

wherein the diameter of the distal section is selected such that the tensioning force causes the distal section to be in a stress-induced martensite state when the proximal section is in a temperature-induced austenite state.

18. The temperature controlled actuator of claim **11**, wherein an austenite transition temperature of the proximal section exceeds an austenite transition temperature of the intermediate section.

19. The temperature controlled actuator of claim **1**, wherein the tensioning element is constantly biased to apply a constant force to the core-wire.

20. The temperature controlled actuator of claim **1**, wherein the tensioning element is constantly biased to apply a variable force to the core-wire.

21. The temperature controlled actuator of claim **1**, wherein the tensioning element comprises a mass suspended from the core-wire.

22. The temperature controlled actuator of claim **1**, wherein the tensioning element comprises an axially moveable member engaging the core-wire, the axial position of the member controlling the tension in the core-wire.

23. A method for providing a mechanical response to a temperature change in a monitored environment, the method comprising:

anchoring a distal section of a core-wire to a distal portion of a housing, the distal section having an austenite state and a martensite state;

biasing the core-wire with a tensile force; and

exposing a thermometric portion of the core-wire to the monitored environment.

24. The method of claim 23, wherein exposing a thermometric portion of the core-wire comprises exposing the distal section of the core-wire to the monitored environment.

25. The method of claim 23, further comprising causing a transition between an austenite state and a martensite state in the distal section in response to a temperature change along the distal section.

26. The method of claim 23, wherein exposing a thermometric portion of the core-wire comprises exposing a proximal section of the core-wire to the monitored environment.

27. The method of claim 26, further comprising causing a transition between an austenite state and a martensite state in the proximal section in response to a temperature change along the proximal section.

28. The method of claim 26, further comprising causing a transition between an austenite state and a martensite state in the distal section in response to a transition between an austenite state and a martensite state in the proximal section.

29. The method of claim 23, wherein biasing the core-wire comprises applying a constant force to the core-wire.

30. The method of claim 23, wherein biasing the core-wire comprises applying a variable force to the core-wire.